José Eduardo Méndez Delgado

Curriculum Vitae

PERSONAL INFORMATION

Birthday:	13/10/1994
Birthplace:	Morelia, Michoacan, Mexico
Nationality:	Mexican
Address:	Heidelberg, Germany.
Mail:	jemd@uni-heidelberg.de

EDUCATION

PhD in Astrophysics 2018-2022

Universidad de La Laguna (ULL)-Instituto de Astrofísica de Canarias (IAC)

Thesis title: "Ionized gas flows in the Orion Nebula: properties and environmental dependences"

Degree awarded with honors

Supervisors: Dr. César Esteban & Dr. Jorge García Rojas.

San Cristobal de La Laguna, Spain

MSc in Astrophysics 2017-2019

Universidad de La Laguna (ULL)

Master's thesis title: "The radial gradient of helium in the Milky Way"

Supervisor: Dr. César Esteban.

San Cristobal de La Laguna, Spain

BSc in Physics 2012-2017

Universidad Nacional Autónoma de México (UNAM)

Bachelor's thesis title: " Temperature inhomogeneities and oxygen abundances in Planetary Nebulae of the Magellanic Clouds"

Degree awarded with honors

Supervisor: Dr. Manuel Peimbert Sierra.

Mexico City, Mexico

RESEARCH EXPERIENCE

Postdoctoral researcher 2022-

Astronomisches Rechen-Institut, Zentrum für Astronomie der Universität Heidelberg, Heidelberg, Germany

PI: Dr. Kathryn Kreckel

Resident Astrophysicist 2018-2022

Instituto de Astrofísica de Canarias, Tenerife, Spain

Supervisors: Dr. César Esteban López & Dr. Jorge García Rojas

Summer Research Fellow 2018

Instituto de Astrofísica de Canarias, Tenerife, Spain

Supervisor: Dr. José Miguel Rodríguez Espinosa & Dr. Helmut Dannerbauer & Dr. Casiana Muñoz Tuñón.

Emeritus Professor Assistant 2014-2017

Instituto de Astronomía UNAM, Mexico City, Mexico

Supervisor: Dr. Manuel Peimbert Sierra

REFEREED ARTICLES

Temperature inhomogeneities in Mrk 71 can not be discarded 2023

Méndez-Delgado, J. E. *Esteban, C.; García-Rojas, J.; Kreckel, K.; Peimbert, M.*

Under review by Nature Astronomy

Nature Astronomy

Density biases and temperature relations for DESIRED HII regions 2023

Méndez-Delgado, J. E.*; Esteban, C.; García-Rojas, J.; Arellano-Córdova, K. Z.; Kreckel, K.; Gómez-Llanos, V.; Egorov, O. V.; Peimbert, M.; Orte-García, M.*

2023MNRAS.523.2952M

Monthly Notices of the Royal Astronomical Society

Temperature inhomogeneities cause the abundance discrepancy in HII regions 2023

Méndez-Delgado, J. E. *Esteban, C.; García-Rojas, J.; Kreckel, K.; Peimbert, M.*

2023Natur.618..249M

Nature

Photoionized Herbig-Haro objects in the Orion Nebula through deep high-spectral resolution spectroscopy - III. HH 514 2022

Méndez-Delgado, J. E.*; Esteban, C.; García-Rojas, J.; Henney, W. J.*

2022MNRAS.514..744M

Monthly Notices of the Royal Astronomical Society

Gradients of chemical abundances in the Milky Way from HII regions: distances from Gaia EDR3 parallaxes and temperature inhomogeneities 2022

Méndez-Delgado, J. E.*; Amayo, A.; Arellano-Córdova, K. Z.; Esteban, C.; García-Rojas, J.; Carigi, L.; Delgado-Inglada, G.*

2022MNRAS.510.4436M

Monthly Notices of the Royal Astronomical Society

Photoionized Herbig-Haro Objects in the Orion Nebula through Deep High Spectral Resolution Spectroscopy. II. HH 204 2021

Méndez-Delgado, J. E.*; Henney, W. J.; Esteban, C.; García-Rojas, J.; Mesa-Delgado, A.; Arellano-Córdova, K. Z.*

2021ApJ...918...27M

The Astrophysical Journal

Photoionized Herbig-Haro objects in the Orion Nebula through deep high-spectral resolution spectroscopy - I. HH 529 II and III 2021
***Méndez-Delgado, J. E.**; Esteban, C.; García-Rojas, J.; Henney, W. J.; Mesa-Delgado, A.; Arellano-Córdova, K. Z.*
2021MNRAS.502.1703M
Monthly Notices of the Royal Astronomical Society

Helium abundances and its radial gradient from the spectra of H II regions and ring nebulae of the Milky Way 2020
***Méndez-Delgado, J. E.**; Esteban, C.; García-Rojas, J.; Arellano-Córdova, K. Z.; Valerdi, M.*
2020MNRAS.496.2726M
Monthly Notices of the Royal Astronomical Society

Atomic Data Assessment with PyNeb: Radiative and Electron Impact Excitation Rates for [Fe II] and [Fe III] 2023
*Mendoza, C; **Méndez-Delgado, J. E.**; Bautista, M; García-Rojas, J.; Morisset, C.*
2023Atoms..11...63M
Atoms

Metallicity Variations in the Local Galactic Interstellar Medium 2022
*Esteban, C.; **Méndez-Delgado, J. E.**; García-Rojas, J.; Arellano-Córdova, K. Z.;*
2022ApJ...931...92E
The Astrophysical Journal

Backscattering and Line Broadening in Orion 2023
*O'Dell, C. R.; Ferland, G. J.; **Méndez-Delgado, J. E.***
2023AJ....165...21O
The Astronomical Journal

On the radial abundance gradients of nitrogen and oxygen in the inner Galactic disc 2021
*Arellano-Córdova, K. Z.; Esteban, C.; García-Rojas, J.; **Méndez-Delgado, J. E.***
2021MNRAS.502..225A
Monthly Notices of the Royal Astronomical Society

The Galactic radial abundance gradients of C, N, O, Ne, S, Cl, and Ar from deep spectra of H II regions 2020
*Arellano-Córdova, K. Z.; Esteban, C.; García-Rojas, J.; **Méndez-Delgado, J. E.***
2020MNRAS.496.1051A
Monthly Notices of the Royal Astronomical Society

Quantifying energetics of molecular superbubbles in PHANGS galaxies 2023
*Watkins, E. J. et al. (inc. **Méndez-Delgado, J. E.**)*
2023A&A...676A..67W
Astronomy & Astrophysics

The Eighteenth Data Release of the Sloan Digital Sky Surveys: Targeting and First Spectra from SDSS-V 2023

*Almeida, A. et al. (inc. **Méndez-Delgado, J. E.**)*
2023ApJS..267...44A
The Astrophysical Journal Supplement Series

Quantifying the energy balance between the turbulent ionised gas and young stars 2023
*Egorov, O. V. et al. (inc. **Méndez-Delgado, J. E.**)*
2023A&A...678A.153E
Astronomy & Astrophysics

Investigating the Drivers of Electron Temperature Variations in HII Regions with Keck-KCWI and VLT-MUSE 2023
*Rickards Vaught, R. J. et al. (inc. **Méndez-Delgado, J. E.**)*
Under review by ApJ
The Astrophysical Journal

TEACHING EXPERIENCE

Computational science I 2021
"Venia Docendi" Professor in Facultad de Física ULL
BSc course
San Cristobal de La Laguna, Spain

Computational science I 2020
"Venia Docendi" Professor in Facultad de Física ULL
BSc course
San Cristobal de La Laguna, Spain

Computational science I 2019
"Venia Docendi" Professor in Facultad de Física ULL
BSc course
San Cristobal de La Laguna, Spain

Computational science I 2018
"Venia Docendi" Professor in Facultad de Física ULL
BSc course
San Cristobal de La Laguna, Spain

Differential and Integral Calculus II 2017
Assistant Professor in Facultad de Ciencias UNAM
BSc course
Mexico City, Mexico

Thermodynamics 2017
Assistant Professor in Facultad de Ciencias UNAM
BSc ourse
Mexico City, Mexico

Differential and Integral Calculus I 2016
Assistant Professor in Facultad de Ciencias UNAM

BSc course
Mexico City, Mexico

Physics 2016
Assistant Professor in Facultad de Ciencias UNAM
BSc course
Mexico City, Mexico

THESIS SUPERVISION

"Investigating the excitation mechanism of the C II λ6578 line in Planetary Nebulae" 2023
Codirected MSc thesis in Astrophysics.
Elena Reyes Rodríguez
Universidad de La Laguna, Tenerife, Spain

"Relaciones de temperatura para el ion de Cl^{2+} en regiones HII y la determinación de abundancias químicas " 2023
Codirected MSc thesis in Astrophysics.
Maialen Orte García
Universidad de La Laguna, Tenerife, Spain

FEATURED SCIENTIFIC COLLABORATIONS

DEep Spectra of Ionized REgions Data base (DESIRED) 2023-
Collection of ultra-deep spectroscopic data to study, in many cases for the first time, the excitation, physical conditions, chemical abundances, and other properties from the weakest emission lines from Galactic and extragalactic ionized nebulae.
PI: José Eduardo Méndez-Delgado
Project in progress

Sloan Digital Sky Survey-V Local Volume Mapper (LVM) 2022-
LVM is an optical, integral-field spectroscopic survey that will target the Milky Way, Small and Large Magellanic Clouds, and other Local Volume galaxies. LVM will make use of new telescopes and newly built spectrographs that cover a wavelength range of 3600-10000 Å, with spectral resolution R∼4000.
Chair of the Nebular Diagnostics & Chemical Abundances Working Group.
We will analyze the internal physics of the hundreds of ionized nebulae covered by the survey. We will study stellar feedback processes and their impact within the surrounding ionized gas, shocks, stellar populations, gas flows, physical conditions, chemical abundances, dust production and destruction, etc. We will also analyze the large-scale Galactic properties, radial gradients of chemical abundances and the analysis of azimuthal variations.

Physics at High Angular resolution in Nearby GalaxieS (PHANGS) 2022-
High resolution observations of nearby galaxies with several telescopes, including ALMA, Hubble, JWST and the VLT. We aim to understand the interplay of the small-scale physics of gas and star formation with galactic structure and galaxy evolution.

My interests focus on large-scale galactic phenomena and their impact on the physical conditions and chemical abundances of ionized gas. As well as the stellar feedback.

I have published various papers with the collaboration and several more have been submitted.

SCHOLARSHIPS

Resident Astrophysicist Position 2018-2022
Instituto de Astrofísica de Canarias
Academic excellence scholarship awarded for doctoral studies.

PhD scholarship for Mexicans residing abroad 2019-2021
Consejo Nacional de Ciencia y Tecnología (CONACyT)
Academic excellence scholarship awarded for doctoral studies.

Summer Scholarship Program 2018
Instituto de Astrofísica de Canarias
Academic excellence scholarship awarded to finance a summer of research.

Carolina Foundation Scholarship 2017-2019
Fundación Carolina, España
Scholarship awarded for academic excellence to carry out master's studies in Spain.

Scholarship for academic excellence 2014-2017
Fundación Laura Alejandra Gallardo, México
Academic excellence scholarship awarded for undergraduate studies.

AWARDS

Recognition from the Chamber of Deputies and the Mexican Senate to the scientific work on the chemical composition of the universe. 2023
Award pending approval in parliamentary session of the federal legislature for the impact of the article "Temperature inhomogeneities cause the abundance discrepancy in H II regions".
Nomination pending approval
Mexico City, Mexico

State Youth Award for Academic Merit. 2014
Award granted by the State of Michoacan to the most outstanding academic career among youth.
Received from the Governor Salvador Jara
Michoacan, Mexico

INVITED TALKS

1)IV Workshop of Chemical Abundances in Gaseous Nebulae: A workshop in honor of Jose Manuel Vilchez "The chemical composition and evolution of the universe"May 6-10, 2024. Sao Jose dos Campos, Brazil

2) LXVI Congreso Nacional de Física 2023"El universo podría ser más metálico de lo que creíamos"October 8-13, 2023. Morelia, Mexico

3) IAU Symposium 384: Planetary Nebulae: a Universal Toolbox in the Era of Precision Astrophysics "The abundance discrepancy in ionized nebulae: which are the correct abundances?" September 4-8, 2023. Krakow, Poland

4) SDSS-V Collaboration Meeting (2023) "HII regions beyond spherical cows: temperature and density inhomogeneities" July 31-August 4, 2023. (Online) New York, USA

5) XIII Día de Nuestra Ciencia "HII regions beyond spherical cows: some of their internal complexities" June 2, 2022. Tenerife, Spain

6) ESO Hypatia Colloquium "Photoionized Herbig-Haro objects in the Orion Nebula through deep high-spectral resolution spectroscopy" June 22, 2021. Online

INVITED SEMINARS

1) Instituto de Astronomía (IA-UNAM) "El efecto t^2: los elementos pesados en el universo podrían ser mucho más abundantes de lo que pensábamos" August 21, 2023. Mexico City, Mexico

2) Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE) "Las consecuencias de las variaciones de temperatura en las regiones HII" August 18, 2023. Puebla, Mexico

3) Instituto de Astrofísica de Canarias (IAC) "Temperature inhomogeneities cause the abundance discrepancy in H II regions" June 13, 2023. Tenerife, Spain

4) Königstuhl Colloquium Max Planck Institute for Astronomy (MPIA) "Temperature inhomogeneities cause the abundance discrepancy in H II regions" June 2, 2023. Heidelberg, Germany

5) Instituto de Astronomía (IA-UNAM) "Radial gradients of chemical abundances in the Milky Way considering internal temperature inhomogeneities" August 17, 2022. Mexico City, Mexico

6) Instituto de Astrofísica de Canarias (IAC) "Photoionized Herbig-Haro objects in the Orion Nebula. Laboratories to better understand ionized nebulae" June 17, 2021. (Online) Tenerife, Spain

7) Instituto de Radioastronomía y Astrofísica (IRyA-UNAM) "Photoionized Herbig-Haro objects in the Orion Nebula. Laboratories to better understand ionized nebulae" June 17, 2021. (Online) Morelia, Mexico

8) Facultad de Ciencias (FC-UNAM) "Divulgación de la Ciencia y su papel en la Agenda Pública" February 16, 2017. Mexico City, Mexico

CONTRIBUTED TALKS

XV Scientific Meeting of the Spanish Astronomical Society "The Orion Nebula through its photoionized Herbig-Haro objects" September 3-10, 2022. Tenerife, Spain

IX Meeting of mexican PhD students in Astrophysics (IX Reunión de Estudiantes de Astronomía) "Photoionized Herbig-Haro objects in the Orion Nebula"December 3, 2021. Online

III workshop on Chemical Abundances in Gaseous Nebulae: From the Milky Way to the Early Universe "Echelle spectroscopy of HH objects in the Orion Nebula. Laboratories to better understand ionized nebulae" May 24-28, 2021. Online

XIII Congreso de estudiantes de Física (ULL) "Ionized gas flows in the Orion Nebula: properties and environmental dependences" April 15-16, 2021. Online

XIV Scientific Meeting of the Spanish Astronomical Society "Photoionized Herbig-Haro objects in the Orion Nebula through VLT's deep spectroscopy I: HH529 II-III" July 13-15, 2020. Online

XI Congreso de estudiantes de Física (ULL) "Inhomogeneidades de temperatura y abundancias químicas" March 15-16, 2018. Online

POSTERS AND ASSISTANCE TO CONGRESSES

European Astronomical Society Annual Meeting Attendance June 27- July 1, 2022. Valencia, Spain

European Astronomical Society Annual Meeting Attendance June 28- July 2, 2021. Online

IAC-RIA workshop EMIR y MEGARA en GTC: preparación de fase 2, tratamiento y reducción de datos AttendanceJuly 1-4, 2019. Tenerife, Spain

European Astronomical Society Annual Meeting Poster "The radial distribution of helium in the Milky Way" June 24- 28, 2019. Lyon, France

II workshop on Chemical Abundances in Gaseous Nebulae Poster "The radial distribution of helium in the Milky Way" March 11-14, 2019. São José dos Campos, Brazil

FRIDA + GTCAO: ciencia con la primera instrumentación de óptica adaptativa en GTC meeting Attendance October 26, 2018. Madrid, Spain

XXVI Congreso Nacional de Astronomía Poster "Inhomogeneidades de temperatura y abundancias de oxígeno en nebulosas planetarias de las Nubes de Magallanes" October 10-13, 2017. Monterrey, Mexico

First Mexican AstroCosmoStatistics School Attendance April 16-21, 2016. León, Mexico

Second Guatemalan School of Astrophysics Attendance November 30- December 4, 2015. Antigua Guatemala, Guatemala

ORGANIZATION OF EVENTS

XI Día de Nuestra Ciencia SOC and LOC member of the congress May 28, 2019. Tenerife, Spain

X National Astronomy Olympiad in Mexico Co-organizer of the event 2014 Puebla, Mexico

VI Latin American Astronomy and Astronautics Olympiad Observer of the event October 10-16, 2014. Montevideo, Uruguay

INSTITUTIONAL PRESS RELEASES

"New analysis reveals more heavy elements in the universe" Heidelberg University May 17, 2023. Germany

"Mayor, la cantidad de algunos elementos químicos en nebulosas" Universidad Nacional Autónoma de México May 18, 2023. Mexico

"An old problem about the measurement of the chemical composition of the universe has been resolved" Instituto de Astrofísica de Canarias May 17, 2023. Spain

"Possible evidence of planet formation found in the Orion Nebula" Instituto de Astrofísica de Canarias June 9, 2022. Spain

"Anatomy of the impact of a protostellar jet in the Orion Nebula" Instituto de Astrofísica de Canarias September 2, 2021. Spain

SELECTED PRESS RELEASES

"Resuelven mexicano y colegas enigma astrofísico" Reforma. June 18, 2023. Mexico

"Grupo de astrofísicos, liderado por un mexicano, resuelve un misterio de hace 80 años" Sin Embargo. May 27, 2023. Mexico

"Científico mexicano, cerca de conectar un hit mundial La silla rota. May 23, 2023. Mexico

"Astrofísico egresado de la UNAM revela posible formación planetaria en Nebulosa de Orión" MVS noticias July 6, 2022. Mexico

"Investigadores del IAC desvelan los efectos del impacto de un jet protoestelar en la Nebulosa de Orión" Radio y Televisión Canaria September 2, 2021. Spain

"Observan efectos del impacto de chorro protoestelar en Orión" Deutsche Welle. September 3, 2021. Germany

OBSERVATIONAL EXPERIENCE

Observing proposals:

1) ID: 17426 / Cycle 312023, JWST, Co-I

2)83-GTC78/23B / 2023, 10m GTC, 16h, OSIRIS, Co-I

3)W22AU / 2022, NOEMA, 11.45h, IRAM, PI

4)F21-3.5-015/ F2021 /2021, 3.5m CAHA, 1 night, PMAS, Co-I

5)21B-3.5-008/ 21B /2021, 3.5m CAHA, 2 nights, PMAS, Co-I

6)2.7_KAproposal_21-3_2.7/ 2021-3 /2021, 2.7-m HJS McDonald observatory, 4 nights, VIRUS-P, Co-I

7)84-GTC78/ 19B / 2019, 10m GTC, 7h, MEGARA, Co-I

Observing nights:

1)2018, IAC80 telescope, CAMELOT2, 4 nights.

2)2018, Mercator telescope, HERMES, 1 night.

3)2018, Isaac Newton Telescope, Wide Field Camera, 2 nights.

Data reduction:

1) GASGANO & ESOREX pipeline/IRAF. UVES at VLT.

SKILLS

Languages:	English, C1, IELTS Academic Certificate 7.0/9.0.
	Spanish, native.
In-depth knowledge of:	Python, IRAF, spectroscopic techniques.